

THREE NEW SPECIES OF MICROCADDISFLIES
(TRICHOPTERA: HYDROPTILIDAE) FROM
THE OZARK MOUNTAINS, U.S.A.

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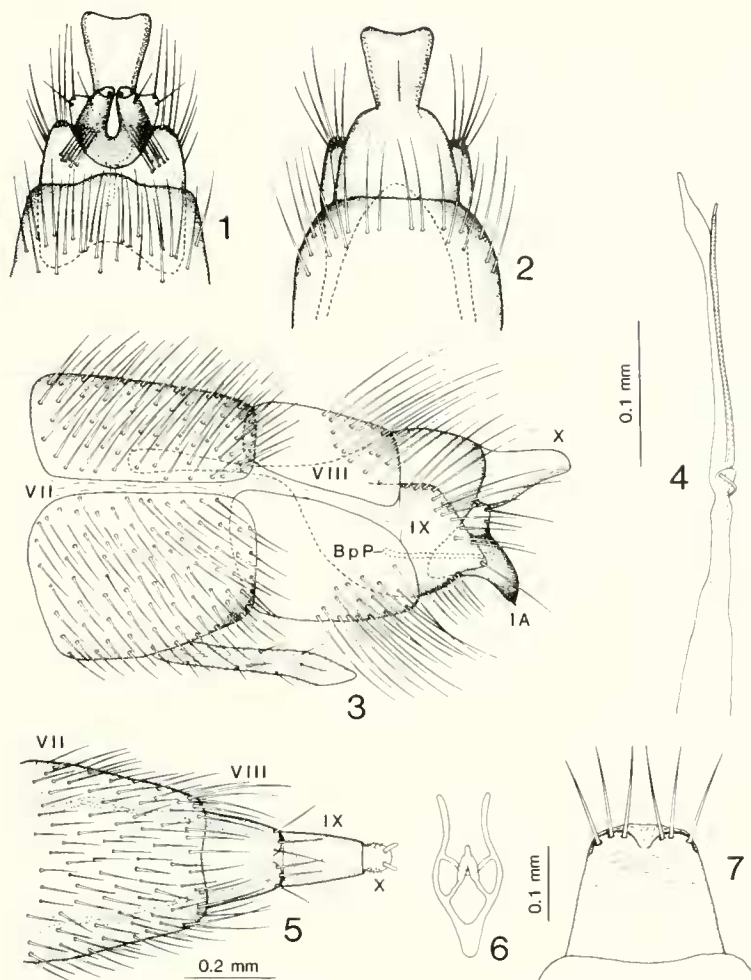
Abstract.—Three new species of hydroptilid caddisflies are described from the Ozark Mountains of Arkansas and Missouri. *Hydroptila artesa* n. sp. and *H. sandersoni* n. sp. are members of the *H. tineoides* species group and are closely related to *H. amoena*, *H. paramoena*, and *H. oneili*. A key separating these five species is presented. *Neotrichia arkansasensis* n. sp. is most closely related to *N. sonora* from the desert Southwest, but is easily distinguished by the shape of the inferior appendages.

Key Words: microcaddisfly, *Hydroptila tineoides* group, taxonomic key, Ozark Mountains, new species

The Interior Highlands encompasses mountainous areas of southern Missouri, northern Arkansas, eastern Oklahoma, eastern Kansas, and southwestern Illinois. The region includes the Ozark and Ouachita Mountains and a number of smaller ranges in Oklahoma and Kansas. Much of the area in Arkansas, Oklahoma, and Missouri is undeveloped or used for light agricultural purposes such as livestock ranching. Streams and springs are abundant and many are unpolluted. The area includes five streams classified as National Scenic Riverways and some of the largest volume springs in North America. Surprisingly, the region is one of the more-poorly studied areas in the United States with regard to its trichopteran fauna. Only Kansas and northwest Arkansas have been sampled intensively (Unzicker et al. 1970, Schuster and Hamilton 1978, Hamilton and Schuster 1978, 1979, 1980, Hamilton et al. 1983). In order to increase our knowledge of the trichopteran fauna of this

region, we have initiated surveys in the mountainous areas of Arkansas, Missouri, and Oklahoma. We describe herein three new microcaddisflies collected from the Ozark Mountains.

Specimens were collected using a UV-light trap with the exception of a single sample from Mammoth Springs, Arkansas, that we obtained from the Illinois Natural History Survey. Terminology and higher taxonomy follow Marshall (1979). In characterizing some species, we use the ratio of the length of the aedeagus to that of the abdomen. The length of the abdomen was measured dorsally from the posterior margin of the metascutellum to the apex of tergite X. Types and voucher specimens are deposited at the American Museum of Natural History (AMNH), Illinois Natural History Survey (INHS), National Museum of Natural History, Smithsonian Institution (NMNH), and University of Arkansas Insect Collection (UAIC).



Figs. 1-7. *Hydroptila artesa*. Figs. 1-4. Male genitalia. 1, Ventral. 2, Dorsal. 3, Lateral. 4, Aedeagus (lateral). Figs. 5-7. Female genitalia. 5, Ventral. 6, Internal apparatus. 7, Eighth sternite (ventral). IA, Inferior Appendage; BpP, Bilobed Process.

***Hydroptila artesa* Mathis and Bowles**

NEW SPECIES

Figs. 1-7

This species belongs to the *H. tineoides* group and is most similar to *H. paramoena* Harris. The new species is distinguished from the latter species by the shape of tergite X, inferior appendages, and aedeagus.

Male.—Length 1.9–2.8 mm. Antennae 30–34-segmented. Color yellowish brown in alcohol. Abdominal segment VII with long ventral process extending to middle of

segment VIII. Segment IX with dorsum broadly rounded, lacking setae; with narrow lateral lobe bearing apical setae; excised deeply anterodorsally and gently postero- and anteroventrally; apodeme long and narrow, arising from dorsal one-half of segment, extending into, but never past segment VII. Segment X fused dorsally with segment IX; lateral margins lightly sclerotized; hood-shaped in lateral view, but not sharply upturned, widening posteriorly in dorsal view, apex emarginate. Inferior ap-

pendages short, beak-like, relatively wide in lateral view; distal portion separated and basal portion fused along meson in ventral view; with broad, thumb-like dorsal projection bearing long setae. Bilobed process present. Aedeagus short, less than one-third length of abdomen; widest at base, with two long, apical processes; process bearing ejaculatory duct long and slender, duct protruding at apex; other process flattened and pointed apically; titillator spirally one-third turn anteriorly.

Female.—Length 2.4–3.4 mm. Antennae 22–26-segmented. Similar to male in general appearance. Abdominal segment VI with broad, spur-like ventral process. Abdomen with three pairs of apodemes; posterior-most pair extending length of segment IX; mesial pair with anterior end expanded and curved toward midline, extending from posterior margin of segment VIII into anterior one-half of segment VII; lateral pair straight, extending from posterior margin of segment IX to posterior margin of segment VI. Segment VIII tapering; sternite with pair of sclerotized lobes posteriorly, each bearing 3 (rarely 4) stout setae, membranous anterior to lobes. Segment IX tapering slightly. Segment X short, ovoid; bearing pair of short cirri subterminally and numerous small setae. Internal apparatus lyre-shaped, with a star-like mesial configuration.

Immatures.—Unknown.

Etymology.—French, referring to the typical spring habitat of the species.

Holotype, male and allotype.—Missouri, Shannon County, Alley Spring, Ozark National Scenic Riverways (O.N.S.R.), 5 mi W Eminence, Hwy 106, 16 August 1987, M. Mathis, S. Tedder (NMNH).

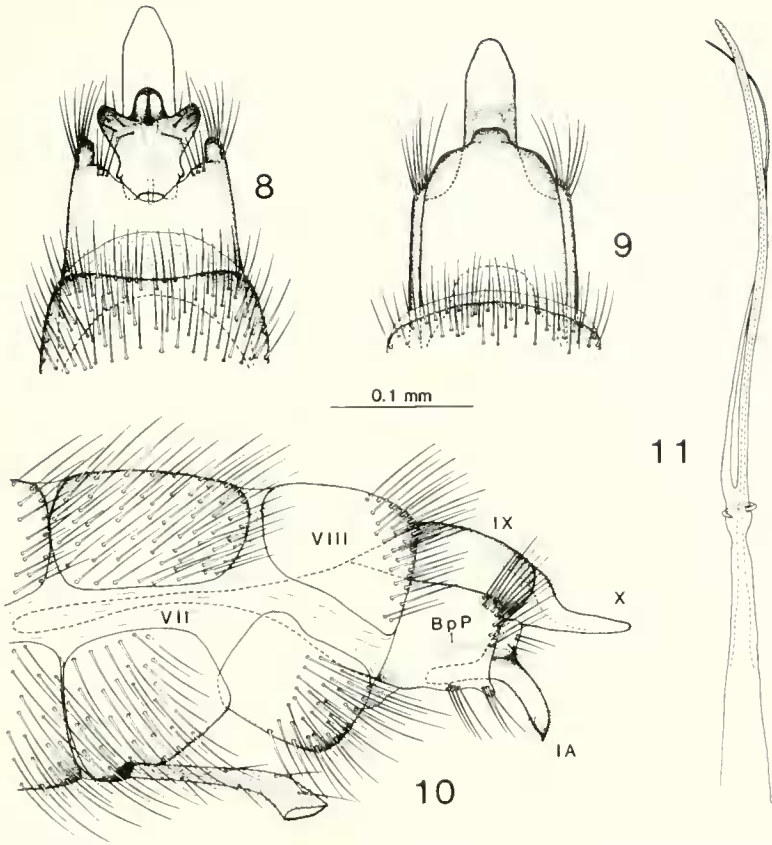
Paratypes.—Same data as holotype, 18 ♂♂, 9 ♀♀ (NMNH, INHS, UAIC); Carter County, Big Spring, O.N.S.R., 7 mi S Van Buren, Hwy 103, 18 August 1987, 15 ♂♂, M. Mathis, S. Tedder (INHS, NMNH); Dent County, Current River, Montauk State Park, 23 mi SE Salem, Hwy 119, 15 October 1988, 7 ♂♂, M. Mathis, D. Bowles (INHS); Oregon

County, Eleven Point River, Hwy 19 bridge, 1.5 mi NE Greer, 6 July 1988, 8 ♂♂, M. L. Mathis, D. E. Bowles (NMNH); Ozark County, Althea Spring, 8 mi NW Caulfield, H Hwy, 8 August 1988, 5 ♂♂, M. Mathis, S. Tedder, L. Tedder (AMNH); Ozark County, North Fork White River, H Hwy bridge, 8 mi NW Caulfield, 8 August 1988, 10 ♀♀, 8 August 1988, M. Mathis, S. Tedder, L. Tedder (AMNH, INHS); Arkansas, Fulton County, Mammoth Spring, 19 July 1969, 4 ♂♂ (INHS).

Discussion.—Males of *Hydroptila artesa*, as well as those of *H. amoena* Ross, *H. paramoena*, and *H. oneili* Harris, have a long ventral process on abdominal segment VII, beak-like inferior appendages, and the phallus divided into two apical processes. *Hydroptila hamata* Morton also has been reported to share these characters, but close examination will reveal a third, spur-like apical phallic process (see Ross 1944; fig. 512D). *Hydroptila artesa* differs from all three species in that the phallus is less than one-third the length of the abdomen and the apical phallic process that lacks the ejaculatory duct is flattened into a broad pointed apex. It is distinguished easily from *H. paramoena*, the most closely related species, in that tergite X is not upturned strongly in lateral view, becomes wider posteriorly and is broadly excised in dorsal view, and the inferior appendages are separated along the meson. Females of *H. artesa* may be distinguished from those of *H. amoena* by the presence of a pair of subterminal lobes on sternite VIII rather than well-developed ovate plates. They differ from those of *H. hamata* in lacking a pair of transverse sclerotized bars anterior to the apex of sternite VIII.

***Hydroptila sandersoni* Mathis and Bowles**
 NEW SPECIES
 Figs. 8–11

This species, like the preceding one, is a member of the *H. tineoides* group and is most closely related to *H. oneili* and *H. amoena*. It is distinguished by the shape of



Figs. 8-11. *Hydropsyche sandersoni*, male genitalia. 8, Ventral. 9, Dorsal. 10, Lateral. 11, Aedeagus (lateral). IA, Inferior Appendage; BpP, Bilobed Process.

tergite X, inferior appendages, and the length of the apodemes.

Male.—Length 2.1-2.3 mm. Antennae 29-30-segmented. Color brown in alcohol. Abdominal segment VII with long, medial, ventral process extending to posterior margin of segment VIII. Segment VIII short, flexed ventrally. Segment IX excised deeply anterodorsally and ventrally and shallowly posteroventrally; dorsum broadly rounded, setation absent; with long narrow lateral lobe bearing many setae along posterior and ventral margins; apodeme long, narrow, extending into segment VI. Tergite X long and slender in dorsal view, tapering posteriorly, apex complete; cap-shaped in lateral view, apex straight or slightly up-turned; fused dorsomedially to posterior of tergite IX,

ventrally to lateral lobes of segment IX. Inferior appendages "beak-like," with dorsolateral thumb-shaped projection bearing several setae; main axis slender in lateral view, fused basally and contiguous along meson in ventral view. Bilobed process short. Aedeagus widest basally, produced into two slender apical processes; process bearing ejaculatory duct thicker of two, gently curving dorsally; ejaculatory duct not protruding or bent; apex of other process narrow, curving sharply dorsally; titillator turning three-quarter revolution anteriorly.

Female.—Unknown.

Immatures.—Unknown.

Etymology.—Named in honor of Dr. Milton W. Sanderson for his many contributions to the study of Trichoptera.

Holotype.—Arkansas, Stone County, Sylamore Creek, Gunner Pool Recreation Area, 20 July 1988, C. Carlton, R. Leschen (NMNH).

Paratypes.—Same as above, 1 ♂ (NMNH); same, but 22 July 1987, 2 ♂ (UAIC); Johnson County, Mulberry River, 5 mi W Oark, Hwy 215, 23 July 1986, 1 ♂, D. Bowles (INHS); Carrol County, Osage Creek, Hwy 68 bridge, 4 August 1985, 1 ♂, D. Bowles, M. Mathis (INHS).

Discussion.—*Hydroptila sandersoni* bears a close resemblance to both *H. amoena* and *H. oneili*, but differs in a number of features. Unlike these species, tergite X of *H. sandersoni* is slender and complete apically, the ventral axis of the inferior appendages is narrow in lateral view, and the apodemes of segment IX are relatively longer and always extend into segment VI. The apex of the ejaculatory duct of *H. sandersoni* is straight and does not protrude, but in *H. oneili*, it is protruding and bent. *Hydroptila sandersoni* was collected from the head-water reaches of warm-water streams in northern Arkansas.

The *H. tineoides* species group encompasses 20 species, all of which are Nearctic except *H. tineoides* Dalman (Palearctic) and *H. moselyi* Ulmer (Oriental). In this group, the inferior appendages are somewhat C-shaped, typically consisting of a short, beak-like ventral axis and a broad dorso-lateral projection bearing one or more long setae. The distal portion of the aedeagus is divided into two or three processes that may be variously modified. Tergite X is well-developed and usually hood-shaped in lateral view. The medial process of sternite VII may be short and spur-like or elongated. A bilobed process is present in at least some species. Within the *tineoides* group there are five species that closely resemble *H. amoena*. In these species, the medial process of sternite VII is elongate, a bilobed process is present, and the aedeagus is divided into two long, slender apical processes. Following is a key to the Nearctic species of the *H.*

tineoides group that are identified as *H. amoena* using either Ross (1944) or Blickle (1979).

1. Aedeagus short, less than one-third as long as abdomen; phallic process lacking ejaculatory duct with apex flattened and pointed . . . *H. artesa*
- Aedeagus longer, greater than one-third as long as abdomen; apical process not as above 2
2. Apex of tergite X complete; ventral axis of inferior appendage slender *H. sandersoni*
- Apex of tergite X excised; ventral axis of inferior appendage stout 3
3. Apex of tergite X with deep, wide excision (see Harris 1985; fig. 8E); tips of phallic processes simple *H. amoena*
- Apex of tergite X only slightly emarginate; phallic process bearing ejaculatory duct with tip modified or bent 4
4. Tergite X strongly upturned in lateral view (see Harris 1985; fig. 8A); phallic process with an apical, rattle-like structure (see Harris 1985; fig. 8D) *H. paramoena*
- Tergite X only slightly upturned in lateral view (see Harris 1985; fig. 9A); phallic process with ejaculatory duct protruding and noticeably bent (see Harris 1985; fig. 9D) *H. oneili*

Neotrichia arkansasensis

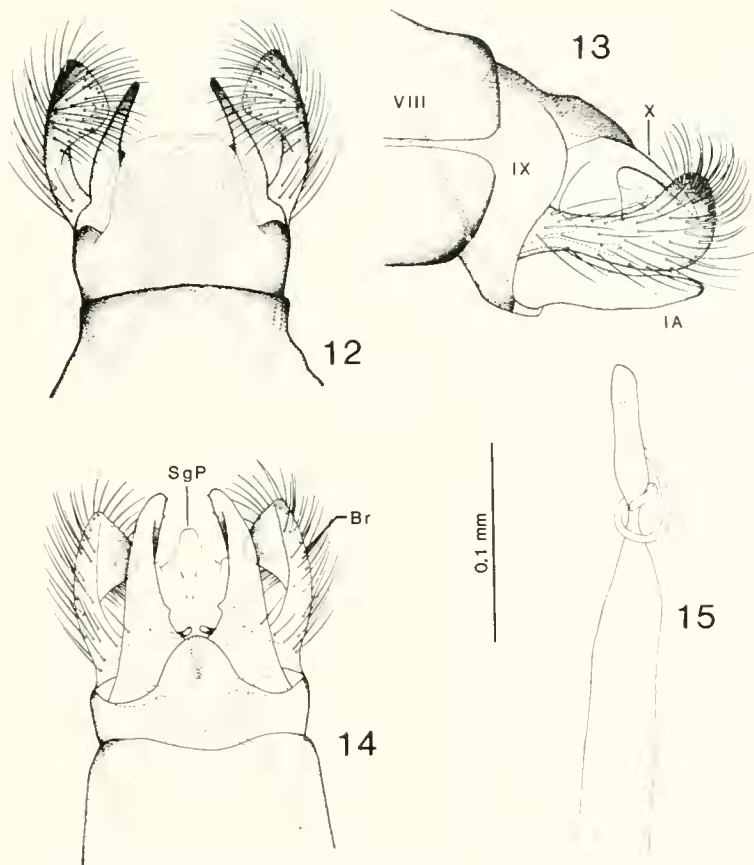
Mathis and Bowles

NEW SPECIES

Figs. 12–15

Neotrichia arkansasensis closely resembles *N. okopa* Ross, *N. sonora* Ross, and *N. osmena* Ross, but it is distinguishable from these species by the shape of tergite X and the inferior appendages.

Male.—Length 2.0–2.4 mm. Antenna 18-segmented. Color brown in alcohol. Abdominal segment VIII small, subquadrate in dorsal view. Segment IX annular. apodeme short; with complex network of internal sclerotization; dorsum membranous, with many small setae; extending posteriorly and covering tergite X. Tergite X consisting of a pair of sclerotized, pointed processes curving posteroventrally and a pair of heavily-sclerotized basal pieces extending ventrally. In dorsal view, basal piece produced into a short, mesial process joined to a concave lateral shoulder; piece sub-



Figs. 12–15. *Neotrichia arkansasensis*, male genitalia. 12, Dorsal. 13, Lateral. 14, Ventral. 15, Aedeagus (dorsal). IA, Inferior Appendage; SgP, Subgenital Plate; Br, Bracteole.

triangular in lateral view. Inferior appendages dark brown to black; tapering throughout length in ventral view, curving slightly dorsad in lateral view; basally with a down-curving, finger-like projection on mesial face and a tooth-like process just posterior to this projection. Bracteoles spatulate, with concave mesial face, bearing many setae. Subgenital process well developed, with rounded mesial lobe flanked on both sides by long setae; bearing two pairs of short setae on midline of ventral surface. Aedeagus with distinct proximal and distal regions; proximal portion long, wide, and cylindrical basally, with a short, tapering neck; distal portion tapering slightly, with a distinct ejaculatory duct and subterminal gen-

ital pore; spiral process large, making one revolution anteriorly before extending posteriorly one-half revolution.

Female.—Unknown.

Immatures.—Unknown.

Etymology.—Latin: of Arkansas.

Holotype.—Arkansas, Madison County, Kings River, 5 mi S Kingston, NW $\frac{1}{4}$, SW $\frac{1}{4}$, Sect. 4, T 15 N, R 24 W, 2 June 1985, D. Bowles (NMNH).

Paratypes.—Same as above, 1 δ (INHS); Johnson County, confluence of Little Piney and Sulfur Creeks, 12 mi N Hagarville, Hwy 123, 7 June 1986, 3 δ , C. Robotham (NMNH, UAIC); Johnson County, unnamed spring, 5 mi W Oark, Hwy 215, 12 June 1986 1 δ , D. Bowles (INHS); Sharp

County, Spring Creek, Spring Creek Wildlife Management Area, 8 June 1988, 1 ♂, R. Leschen (UAIC).

Discussion.—*Neotrichia arkansasensis* is most closely related to *N. sonora*, but also shares a number of characters with *N. okopa* and *N. osmena*. In *N. arkansasensis* and *N. sonora*, tergite X is produced into two long, downturned, sclerotized points that are poorly developed in both *N. okopa* and *N. osmena*. The darkly sclerotized base of tergite X viewed laterally forms a large triangular-shaped plate in *N. arkansasensis* and *N. sonora*, but it is reduced in *N. osmena* and forms a narrow point in *N. okopa*. The most outstanding difference between *N. arkansasensis* and *N. sonora* is the shape of the inferior appendages. In *N. arkansasensis*, they are straight or slightly upturned in lateral view, taper throughout their length and are straight or converging in ventral view, and have a finger-like process arising basally from the mesial face. The inferior appendages of *N. sonora* are sharply upturned in lateral view, taper abruptly near the apex and are diverging in ventral view, and have the finger-like process arising near the midlength of the mesial face. The two species also differ in the shape of the sclerotized basal portion of tergite X; in ventral view, it forms a sharply angular triangle in *N. sonora*, but in *N. arkansasensis* it has a concave lateral face and forms a blunt point distally.

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